REMARKS/ARGUMENTS

Prior to this Amendment, claims 1-21 were pending in the Application.

Claim 1 is amended to clarify that the test apparatus is for use with wind turbine blades attached at one end and that the actuator moves a mass perpendicular to the longitudinal axis of the blade to apply a bending or flap load. Claim 7, which depends from claim 1, is amended to clarify the mounting location of the transverse load actuator. No new matter is added by this amendment with support found at least in the first paragraph of page 4 with reference to Figures 1-3.

Independent claim 10 is amended to clarify that the specimen is attached a first end but free to be displaced at a second end (e.g., cantilever mounting) and the reciprocating mass means is mounted between the first and second ends of the specimen.

Independent claim 12 is amended to clarify the method is for testing wind turbine blades including providing cyclical flap loading.

After entry of the Amendment, claim 1-21 remain for consideration by the Examiner.

In the prior amendment, Applicant provided a Rule 1.131 Declaration showing that Davidson is not available as prior art, and the Examiner has argued that the declaration is ineffective and has maintained his rejections based on this reference. Applicant disagrees with the Examiner's decision, and Applicant retains the right to again address the sufficiency of the declaration. However, to hasten prosecution in this case, Applicant is providing claim amendments and remarks that further distinguish the claimed subject matter from this reference.

Claim Rejections under 35 U.S.C. §102

The Office Action rejected claims 1-5 and 9-14 under 35 U.S.C. §102(e) as being unpatentable over U.S. Pat. No. 6,601,456 ("Davidson"). This rejection is respectfully traversed based on the following remarks.

Claim 1 is directed toward an apparatus for applying a cyclical load to a specimen that "comprises a wind turbine blade that is rigidly mounted at a root end and unsupported at a tip end." Davidson fails to teach an apparatus for mounting a test specimen in this manner, and, hence, Davidson cannot anticipate claim 1 for this

reason alone. Further, claim 1 calls for an actuator that provides linear displacement of a mass along a linear displacement path that is perpendicular to the longitudinal axis. Davidson fails to shown a mass that is moved perpendicular to the specimen but, instead, teaches inertial masses rigidly clamped to the specimen.

Still further, claim calls for the actuator to be mounted to the wind turbine blade "such that the moving of the mass relative to the wind turbine blade applies a bending load to the specimen." The actuator in Davidson applies forces along the longitudinal axis of the specimen and the cited portions apply fretting stresses and do not move (e.g., the actuator does not show applying flap/bending loads to a wind turbine blade or other specimen). Claim 1, as amended, further clarifies the differences in the configuration of the apparatus by calling for displacement of the tip (which is unsupported) relative to the longitudinal axis of the specimen, whereas Davidson shows both ends rigidly supported in clamps. For all of these reasons, Davidson fails to anticipate the apparatus of claim 1, and each of these differences is discussed further in the following remarks.

First, the Office Action cites Davidson as teaching all of the limitations of claim 1, and it may be useful initially to discuss more generally what teaching is provided by Davidson. As discussed in the Background, Davidson is directed toward providing an improved test apparatus for simulating damage/wear that may occur due to "fretting." Fretting is described as being the damage that "occurs on a load-bearing contact surface between two pieces of mating material" (col. 1, lines 19-24). To this end, Davidson shows a test machine 10 in Figure 1 with a pair of actuators 16a, 16b that provide the static and dynamic loading of a specimen 21 (col. 3, lines 53-65). Coupling cylinders 14 include specimen grips 14a, 14b to couple with the two ends of the elongate specimen 21 to rigidly support both ends.

Beginning at line 35 of col. 4, Davidson describes operation of the actuators 16a, 16b to apply loads (static and dynamic) to the specimen 21, and, significantly, these loads are applied along the longitudinal axis B-B of the specimen 21 and not perpendicular to axis B-B. As described at col. 5 beginning at line 34, the fretting fixture 20 is provided to create fretting stresses between a fretting piece 24 and the surface of the specimen 21 as the specimen 21 is moved by actuators 16 as shown with the

arrows in Figure 3 (i.e., dynamic translation motion shown by arrow is parallel to the longitudinal axis of the specimen 21 to cause fretting with abutting fretting piece 24, which is stationary relative to the piece/specimen 21). With reference to Figures 2 and 3 and cols. 5 and 6, it can be understood that the fretting fixture has fretting piece 24 in abutting contact with specimen 21 and clamping frame 22 is used to apply "an adjustable **static** loading force" normal to the specimen. In other words, the fretting fixture is fixed in place during use of the testing machine 10 with its inertial masses 23 being fixed in place with clamps 22b and rods 22a (i.e., there are no arrows showing displacement of the masse 23a, 23b during testing in Figure 3 or elsewhere).

Now, turning again to the specific claim language, claim 1 calls for the specimen to be a wind turbine blade, and Davidson fails to show such a test specimen as it shows a rectangular, elongate specimen in Figures 1-3 (see, also, description of the specimen at col. 6, lines 43-53). Significantly, claim 1 also calls for the specimen to be supported at a root end and unsupported at a tip end. Davidson teaches away from such a mounting arrangement for its specimen 21. In Figures 1 and 2, the specimen 21 is shown to be rigidly mounted at both ends by grips 14a and 14b, which makes sense to allow application of static and dynamic compression and tensile forces on an elongate test specimen. For at least these reasons, claim 1 is not anticipated by the teaching of Davidson.

Further, claim 1 calls for an actuator that moves a mass along a linear displacement path that is perpendicular to the longitudinal axis of the specimen so as to apply a bending/flap load to the specimen. In contrast, Davidson shows a fretting fixture 20 that is clamped via clamps 22 such that a fretting piece 24 abuts the specimen. The load applied is normal, but there is no movement of the inertial masses in a dynamic fashion relative to the specimen 21. At col. 5, lines 47-56, Davidson clearly states that the fretting piece 24 provides "static loading" to cause fretting "when specimen 21 undergoes oscillatory translation motion." In other words, the fretting fixture 20 is stationary and the piece 21 is moved by actuators 16.

The Office Action on page 3 cites Davidson at col. 7, lines 13-29 and Fig. 3 as showing this aspect of the apparatus of claim 1, but it appears the Examiner is merely discussing "adjusting" and measuring of fretting contact as showing movement of the

masses 23. Applicant strongly disagrees as this teaches adjusting the clamps and other components to get a desired static load and not for dynamically moving the masses 23, and, further, there are no actuators shown for moving the masses. The oscillatory translation motions described in lines 13-29 are only of the test specimen and not of the masses 23. Hence, there is simply no teaching of the actuator as called for in claim 1 in Davidson, and claim 1 is not anticipated by this reference for this additional reason.

Still further, claim 1 calls for the reciprocating to be done at about the reciprocating frequency of the test specimen so as to cause "displacement of the tip relative to the longitudinal axis of the specimen." Davidson teaches that both ends are firmly clamped and that the specimen is moved back and forth along its longitudinal axis. There is no suggestion that either of the tips of specimen 21 of Davidson is allowed to be displaced relative to axis B-B. Further, neither of the masses 23 is able to move along axis A-A let alone at a reciprocating frequency that is equal to the resonance frequency of the specimen to cause the desired displacement of a specimen (including movement of an unsupported tip). For these additional reasons (e.g., Davidson fails to show the control system of claim 1), Davidson fails to anticipate claim 1, and Applicant requests that the rejection based on Davidson be withdrawn.

Claims 2-5 and 9 depend from claim 1 and are believed allowable over Davidson at least for the reasons provided for allowing claim 1 over this reference.

Independent claim 10 is directed to a system for vibrating a test specimen such as a turbine blade. The system includes a reciprocating mass means that operates to sinusoidally vibrate the specimen along its longitudinal axis at about a resonance frequency. In the system, the specimen is supported rigidly at a first end but is unsupported at a distal second end, and the reciprocating mass means is mounted to the specimen between the first and second ends. A control means is provided that operates the reciprocating mass means such that a vibration displacement of the specimen is varied. Davidson fails to show either element of claim 10, and Applicant requests that the anticipation rejection of claim 10 be withdrawn.

First, the specimen is only supported at a first end and is unsupported at a second end, which facilitates the sinusoidal vibration at the specimen's resonance

frequency. Davidson, as discussed with claim 1 and as shown in Figures 1-3 of Davidsion, shows the specimen 21 being rigidly mounted at each end. Hence, the test machine 10 of Davidson teaches a different device and does not anticipate claim 10.

Second, in claim 10, the reciprocating mass means is mounted between the first and second ends of the specimen and is adapted to provide sinusoidal vibration of the specimen along its longitudinal axis. The Office Action cites Davidson as showing this with the fretting structure 20 at Figure 3 and col. 7, lines 13-29, but Davidson shows, instead, that the fretting structure 20 has no actuators but is instead claimed to the specimen 21 via claims 22 to provide static loads (to create fretting on the specimen surface). The dynamic loading in the machine 10 is provided by actuators 16, which are mounted to the ends of the specimen, and there is no teaching of sinusoidally vibrating the specimen 21 along axis B-B (e.g., Applicant request that a specific citation in Davidson be provided for the sinusoidal vibration or the rejection be withdrawn as not supported by the reference).

Claim 11 depends from claim 10 and is allowable over Davidson at least for the reasons provided for allowing claim 10 over this reference. Further, claim 11 includes limitations similar to those found in claim 1, and the reasons for allowing claim 1 over Davidson are applicable to claim 11.

Independent claim 12 is directed toward a method for vibrating a wind turbine blade specimen. The method includes mounting a mass nearer to the tip than to the root of the blade, and the mounting is performed such that the mass can be reciprocated along a linear displacement path that is perpendicular to the blade axis such that a flap load is applied. The method also calls for reciprocating the mass at about the resonance frequency of the blade/specimen. As discussed above with reference to claims 1 and 10, Davidson fails to show a number of the limitations of claim 12, and Applicant requests that the rejection be reconsidered and withdrawn.

Specifically, Davidson fails to show a test specimen that is a wind turbine blade but instead shown a rectangular specimen 21. Further, Davidson fails to show mounting a mass onto the specimen "nearer to the tip than to the root" of the specimen. This is useful for achieving the desired vibration of the blade with less force and is typically done by placing the mass at about two thirds to three fourths of the span of the

blade (see page 8 of Applicant's specification). Davidson, instead, teaches that its fretting fixture 20 is positioned such that the piece 24 contacts the specimen 20 midway along the length of the specimen (col. 5, lines 4-10). For this reason alone, claim 12 is not anticipated by this reference.

Further, the mounting is done such that the mass may be reciprocated along a linear displacement path perpendicular to the longitudinal axis of the specimen to apply a flap load. Again, Davidson is not directed to blade testing so does not show applying a flap load. Further, though, Davidson shows that the fretting fixture 20 is configured such that the masses 23 are clamped relative to the specimen 21 to provide static loading, and there is no arrangement or provisions for reciprocating the masses 23 to apply a flap or other dynamic loading to the specimen 21. The only dynamic loading is provided by the actuators 16, which do not provide the masses 23 but simply reciprocate to cause the specimen 21 to move along axis B-B relative to the fretting piece 24. Hence, Davidson fails to show the mounting step of claim 12.

Further, claim 12 calls for reciprocating the mass, and Davidson fails to show this with its mere mention of adjusting the masses 23 at col. 7, lines 13-29 and Figure 3 (e.g., if you remove the actuators 16, how would the masses 23 be reciprocated at the resonance frequency of specimen 21 – by hand?). Davidson fails to show the reciprocating step of claim 12. Claims 13 and 14 depend from claim 12 and are believed allowable over Davidson at least for the reasons provided for allowing claim 12 over this reference.

Claim Rejections under 35 U.S.C. §103

The Office Action rejected claims 1, 7, 8, 12, and 15-20 under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. No. 6,732,591 ("Miles") in view of U.S. Pat. No. 6,601,456 ("Davidson"). This rejection is respectfully traversed based on the following remarks.

Claim 1 is allowable over Davidson for the reasons provided above (i.e., Applicant has shown that Davidson fails to anticipate claim 1), and Miles fails to overcome the deficiencies of Davidson. Specifically, Miles is directed to a testing device 10 that is shown in Figures 1 and 3. As seen in Figure 3, Miles teaches rigidly clamping with clamps 16, 18 to the ends of the test specimen 12. Actuator 24 shown in

Figure 2 is used to apply a force along the longitudinal axis of specimen 12. A shaker 26 may be used to apply a load transverse to this longitudinal axis, but the shaker 26 applies its forces to the clamp 18.

As can be seen, Miles fails to show that the specimen includes a wind turbine blade that is "rigidly mounted at a root end and unsupported at a tip end" but instead shows a specimen rigidly mounted at both ends. Additionally, Miles fails to shown "wherein the actuator is mounted at a location between the root end and the tip end of the specimen such that the moving of the mass relative to the wind turbine blade applies a bending load to the specimen." In contrast, the shaker 26 is mounted or attached to the end clamp 18. Further, Miles fails to show or suggest the reciprocating of the mass is chosen for "causing displacement of the tip relative to the longitudinal axis of the specimen." In contrast, both ends of the specimen 12 are rigidly clamped in the devices 10 of Miles. Hence, Mills considered alone or in combination with Davidson fails to teach or suggest one or more of the limitations of claim 1.

Claims 7 and 8 depend from claim 1 and are believed allowable over Davidson and Miles for the reasons provided for allowing claim 1 over these two references. Further, claim 7 is amended to call for the transverse load actuator to also be mounted to the blade between the root and tip ends (such as proximate to the flap loading device). The shaker 26 in Miles is mounted to the end clamp 18 and not along the length of specimen 12. For this additional reason, Miles and Davidson fail to show the apparatus of claim 7.

Claim 12 is allowable over Davidson for the reasons provided above explaining how this reference fails to anticipate the mounting and reciprocating steps of the claim. Further, Miles fails to overcome the deficiencies of Davidson as discussed with reference to claim 1. For example, Miles fails to show mounting a mass to the specimen "nearer to the tip than to the root" but instead shows mounting or attaching a shaker 26 to an end clamp 18. Claims 15 and 16 depend from claim 12 and are believed allowable over Davidson and Miles at least for the reasons provided for allowing claim 12 over these references.

Independent claim 17 includes limitations similar to those found in claims 7 and 12 and is believed allowable over Miles and Davidson for the reasons provided for

allowing these claims over these two references. Claims 18-20 depend from claim 17 and are allowable over Miles and Davidson at least for the reasons provided for allowing claim 17.

In the Office Action, claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Davidson in view of U.S. Pat. No. 7,233,476 ("Goldenberg"). Claim 6 depends from claim 1 and is allowable over Davidson at least for the reasons for allowing claim 1 over this reference. Additionally, Goldenberg fails to overcome the deficiencies of Davidson discussed with reference to claim 1.

Additionally, in the Office Action, claim 21 was rejected under 35 U.S.C. §103(a) as being unpatentable over Miles in view of Davidson in further view of U.S. Pat. No. 6,442,534 ("Au"). Claim 21 depends from claim 17 and is believed allowable over Miles and Davidson for the reasons provided for allowing claim 17 over these two references. Further, Au fails to overcome the deficiencies of Miles and Davidson with reference to claim 17.

Conclusions

In view of all of the above, it is requested that a timely Notice of Allowance be issued in this case.

A fee for a two-month extension of time is provided with this filing. No other fee is believed due with this submittal. However, any fee deficiency associated with this submittal may be charged to Deposit Account No. 14-0460.

Respectfully submitted,

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